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ABSTRACT

This paper examines the theoretical basis for "excessive" job mobility among certain groups of young workers that may lead to spells of unemployment and low lifetime earnings. An economic model of job findings by young workers is used to describe "normal" behavior and "pathological" cases of excessive job mobility and unemployment. Emphasis is on imperfect information, especially about the workers' own tastes and abilities. Theoretical results are derived by assuming that workers maximize expected earnings subject to the constraints facing them. By varying the givens of the problem (e.g., the degree or source of ignorance) the effects on job mobility and lifetime earnings are derived. The results show that ignorance about one's own tastes and abilities contributes to the duration of the high mobility period at the outset of a worker's worklife. The assumption that information about the labor market is generated by the young worker's social milieu, his parents, and neighbors is examined. A feedback effect may exist by which the low level of labor market achievement of one generation of workers restricts the information available to the next generation, which reduces the attainment of the next generation. In this case, there is a low attainment "trap" which may be hard to break out of. (Author)

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Abnormal Youth Unemployment and Imperfect Information

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University of Virginia

Final Report

September 1978--March 1979.

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Summary: Abnormal Youth Unemployment and Imperfect Information

Objectives

The purpose of this paper is to examine the theoretical basis for the "excessive" job mobility among certain groups of young workers that may lead to frequent spells of unemployment and low lifetime earnings. The paper presents an economic model of job finding by young workers in an attempt to describe both "normal" behavior of young workers in entering the labor force and "pathological" cases of excessive job mobility and unemployment. The emphasis of the paper is on imperfect information, especially about the worker's own tastes and abilities.

Methodology

The theoretical methodology assumes that the quality of a match between worker and job depends on both the characteristics of the job and of the worker. Given ignorance about the actual nature of these characteristics at the outset of the working life, workers act as though these values are drawn randomly. As they try jobs, their observations on wages or job satisfaction gradually reveal to them their own abilities and interests, which reduces the uncertainties about future jobs. Eventually they settle on an ultimate career. Theoretical results are then derived by assuming that workers maximize expected earnings subject to the constraints facing them. By varying the givens of the problem, such as the degree or source of ignorance, the effects on job mobility

and lifetime earnings levels can be derived.

Findings

The results show that ignorance about his own tastes and abilities contributes to the duration of the high mobility period at the outset of a worker's worklife. Therefore, workers with greater knowledge along these lines will spend less time moving between jobs and unemployed in the period between jobs. Their lifetime earnings will also be higher.

The second half of the paper examines the assumption that information about the labor market is generated by the young worker's social milieu, his parents and neighbors. If so, then a feedback effect may exist by which the low level of labor market achievement of one generation of workers restricts the information available to the next generation, which then reduces the attainment of the next generation. In this case, there is a low attainment "trap" which may be hard to break out of.

Policy Implications

One implication of this paper is that some job mobility and unemployment is desirable since it represents a rational response to uncertainties about the nature of job matches. To the extent that these uncertainties stem from imperfect information about the worker's own characteristics, it is difficult to argue for public policy on efficiency grounds. Encouragement of formal schooling may enhance workers'

self-knowledge and hence act as a substitute for discovering tastes and abilities through a succession of jobs.

The feedback model suggests that forceful action, and a lot of time, may be required to move a group from a low attainment equilibrium to a high attainment position. The time is required for the informal information networks to be set up to give young workers adequate knowedge about the labor market.

Abnormal Youth Unemployment and Imperfect Information

At the beginning of a young worker's career, he undergoes a period of rapid job turnover and frequent spells of unemployment which can be thought of as "job shopping". Many economists identify the high rates of turnover during this stage of the life cycle as the major reason for high youth unemployment rates.[1] Job shopping behavior stems from imperfect information about the potential quality of jobs available to the worker. This imperfect information arises from three types of ignorance:

1. ignorance about the characteristics of particular jobs;
2. ignorance about worker abilities and preferences;
3. ignorance about the distribution of potential job matches.

The first sort of ignorance, that of job characteristics, has formed the basis for the voluminous literature on the economics of job search, which emphasizes that time must be expended for workers to acquire information about jobs.[2] Since this line of argument is well known and need not be expanded on here, we turn to the other two categories of ignorance.

A. Ignorance of Own Tastes and Abilities

The other two species of ignorance have not been considered in detail even though they are likely to be important factors during the job shopping period. The first of these, ignorance of the worker's own tastes and abilities, is in a sense parallel to his ignorance of job characteristics. Since the quality of the job match is a function of both worker and job characteristics, uncertainty about either leads to imperfect information about the quality of potential employment. The search literature has emphasized the policy role of improved information about specific jobs (through computer job banks, etc.) as a way of reducing the turnover and unemployment associated with search. Equally important, for entering workers, is the ignorance of their own tastes and abilities which leads to uncertainty about job matches. This second type of ignorance is not only important for young workers but also justifies a conscious strategy of job shopping in order to learn about one's own tastes and

abilities. That is, each additional job match experienced will reduce uncertainty about abilities and tastes; thus job shopping is a way of improving the quality of the ultimate job match — the worker's life-time career.

To model this process simply, suppose the worker's satisfaction from the job match (which will be a function typically of "psychic" satisfaction as well as wages) is composed both of a job specific component and a worker-specific component. Let

$$(1) \qquad x_{ij} = \theta_i + u_{ij}$$

where x_{ij} is the satisfaction of worker i at job j,

θ_i is worker i's person-specific component,

and u_{ij} is the job specific factor for worker i.

Before working at any job, the worker knows only that his θ_i is drawn from a distribution in the population $f(\theta)$ while each u_{ij} is a draw from $g(u)$. For simplicity, assume that f and g are mean zero distributions and that θ and u are independently distributed.

At the outset of the career, the variance of x is $\sigma_\theta^2 + \sigma_u^2$. However, after holding each job (which provides one observation on x), this variance will fall. That is, $\sigma^2(x_t \mid x_1, x_2, x_3, \ldots, x_{t-1})$ is non-decreasing in t. More observations on x can only tighten the probability distribution on x for any worker. Intuitively, the process may go like this: if the first observation on x is positive, then the expected value of θ is positive. However, there is still an ex post probability distribution on θ because x is also affected by u, the job specific factor. Hence, a positive x may simply be the result of a particularly favorable u. The speed at which information can be acquired through job shopping is a function of $\sigma_\theta^2/\sigma_u^2$. The job specific factor, u, enters as "noise" making it difficult to discern the true value of θ with observations on x. The greater the proportion of variance of x attributable to the person-specific factor θ, the more information a wage observation will contain about θ. In the extreme, if $\sigma_u^2 = 0$, then $x = \theta$, and the first observation

on x reveals θ perfectly; on the other hand, when $\sigma_\theta^2 = 0$, all variation is job-specific and no learning can take place. In that case, the variance of x remains constant.

So far we have demonstrated that during the job shopping phase, the sequence of jobs held reduces the uncertainty workers feel about their own tastes and abilities, and thereby reduces the dispersion of potential job offers. Therefore, the variance of the next job's satisfaction depends on the initial variance, $\sigma_\theta^2 + \sigma_u^2$, and the ratio of person-specific variance to pure noise, $\sigma_\theta^2/\sigma_u^2$. The higher the initial variance, ceteris paribus, the greater the variance of x in any subsequent period; likewise, the greater the ratio $\sigma_\theta^2/\sigma_u^2$, the smaller the variance of x for the second, third, fourth jobs atc. Hence, the nth job's x depends positively on $\sigma_\theta^2 + \sigma_u^2$ and negatively on $\sigma_\theta^2/\sigma_u^2$.

We now show that the probability of mobility depends negatively on mobility cost and rises with the variance of job satisfaction. The probability of mobility is just the

probability that x on the current job is less than expected x on the next job less mobility cost. If H_n is the distribution function for x_n, then the probability of moving from job n is just $H_n[E(x_{n+1}) - C]$, where C is mobility cost. For the normal distribution function, assuming that $E(x_{n+1})$ is equal to $E(x_n)$, it is clear that the probability of mobility falls with C and rises with the variance of H_n. The greater the probability of moving from the nth job, the longer the expected duration of job shopping, other things equal.

Coupled with the previous observation about the composition of the variance of x, we can express the expected duration of job shopping as a function of:

- $\sigma_\theta^2 + \sigma_u^2$, total dispersion at the outset of job shopping;
- $\sigma_\theta^2 / \sigma_u^2$, the ratio of person-sepcific to job-specific variance;
- C, the cost of mobility.

That is, job shopping is quickest when overall dispersion is low, the person-specific component is important, and the

cost of mobility is high. This suggests that groups in the population who have more precise initial knowledge of their own tastes and abilities (θ) will engage in a shorter job shopping phase of their working careers, given σ_u^2, ignorance about jobs.

We consider now the effect of ignorance about θ in reducing lifetime income. To see this rigorously in a simple model, suppose there are two jobs with earnings given solely as a function of θ. In other words, we simplify by letting $\sigma_u^2 = 0$. There are two jobs, with the same mean x, but job one is assumed to reward θ more than job two:

$$(2) \qquad x_i = a + b_i\theta \qquad i = 1,2 \qquad b_1 > b_2 > 0.$$

Ability, θ, is assumed to be distributed normally in the population with mean 0 and variance σ_θ^2. Assume a two period working life with mobility between jobs possible only between periods. We can now compute the effect of ignorance of θ on the lifetime mobility patterns and incomes of workers.

Consider first the case of perfect information. When θ

is known, the worker's choice of job is easy. Those workers with above average ability ($\theta > 0$) will choose job one, the job that rewards ability the most. Low ability workers choose job two. Since there are no surprises in first period earnings, there will be no mobility between periods. Lifetime (undiscounted) earnings, conditional on θ, are:

$$(3) \qquad \begin{array}{ll} a + b_1\theta & \text{for } \theta > 0 \\ a + b_2\theta & \text{for } \theta < 0. \end{array}$$

Expected earnings for an individual randomly selected from the population is:

$$(4) \qquad \int_{-\infty}^{0} (a + b_2\theta) f(\theta) d\theta \quad + \quad \int_{0}^{\infty} (a + b_1\theta) f(\theta) d\theta \quad ,$$

where $f(\theta)$ is the normal density function.

Using the fact that the mean of the lower half of a standard normal distribution is $\sigma/(2\pi)^{\frac{1}{2}}$, (4) becomes

$$(5) \qquad \frac{a}{2} - b_2\sigma_\theta/(2\pi)^{\frac{1}{2}} + \frac{a}{2} + b_1\sigma_\theta/(2\pi)^{\frac{1}{2}} =$$

$$a + (b_1 - b_2)\sigma_\theta / (2\pi)^{\frac{1}{2}} .$$

Since second period income is identical, lifetime expected earnings with perfect information is just twice expression (5).

Turning to the polar opposite case of total ignorance about θ, consider first-period income. It has been shown in Johnson (1978) that the optimal sequence of jobs is to begin with the highest variance job. In this case, since $b_1 > b_2$, job one will be chosen first. Therefore expected first-period earnings for a randomly selected worker is:

$$(6) \qquad \int_{-\infty}^{\infty} (a + b_1\theta)f(\theta)d\theta = a.$$

Earnings in period one reveal perfectly the true level of θ; if earnings are greater than a, then second period earnings are maximized by staying in job one. If, on the other hand, earnings in the first period are less than a, then the worker has low ability and will move to job two for the second period. Expected second period earnings are, therefore:

$$(7) \qquad \int_{-\infty}^{o} (a + b_2\theta)f(\theta)d\theta + \int_{o}^{\infty} (a + b_1\theta)f(\theta)d\theta =$$

$$= [a/2 - b_2\sigma_\theta /(2\pi)^{\frac{1}{2}}] + [a/2 + b_1\sigma_\theta /(2\pi)^{\frac{1}{2}}]$$

$$= a + (b_1 - b_2)\sigma_\theta / (2\pi)^{\frac{1}{2}}$$

The cost of imperfect information about θ is, then, the difference between lifetime income with and without knowledge of θ:

$$(8) \qquad (b_1 - b_2)\sigma_\theta / (2\pi)^{\frac{1}{2}} .$$

The cost is proportional to the variance of ability in the population and to the difference in the reward to ability between the two jobs.

There are two important conclusions which follow from this analysis; one of the conclusions is positive, the other normative. The positive conclusion is that the particularly difficult time workers in some demographic and social groups appear to have in settling down to a lifetime career may be in part attributable to their lack of self-knowledge, as well as the more familiar deficiency of market information. For a worker who is ignorant about his own tastes and abilities, a long period of job shopping may be his best strategy. To the extent that job shopping improves the quality of the ultimate job match, its optimal amount is not zero.

Thus "excessive" job mobility may be a worker's rational response to imperfect information.

The interesting question is whether any normative conclusions follow from this analysis. In the search literature, a standard policy recommendation is that, since job-specific information is a good with very low marginal costs of dissemination, public provision is warranted. Hence, policies such as improved job information services are often suggested. In the case of person-specific information, however, no such informational externalities exist. That is, knowledge of tastes and abilities benefits only the worker involved and not other workers. The standard efficiency argument for the provision of the public good, the existence of external benefits, does not hold in this case. Hence any policy which attempts to treat this informational deficiency must be based on either paternalism (workers don't know

what's good for them) or redistributional arguments. The paternalistic argument might take the following forms: analogous to one of the standard arguments in favor of public education, it could be contended that myopic young workers are not able to make wise decisions when the benefits appear only in the long run. Hence, they will not invest privately in information to the extent required by efficiency. The state can then play a role in encouraging this investment. But what can the government do to improve workers' knowledge of their own tastes and abilities? One possibility is that formal education contributes to workers' self-knowledge. This would imply that workers with less schooling undergo longer spells of job shopping than their more educated counterparts. It also suggests that one of the benefits of education may not be properly accounted for, if that benefit is the reduced turnover and unemployment which accompanies job shopping.

To summarize this section of the paper, we have argued

that the uncertainty about potential job matches can be divided into job-specific and person-specific components. The job-specific component has been analyzed extensively by the theory of job search. The person-specific component can be thought of as the worker's ignorance about his own tastes and abilities. Clearly both components lead to uncertainty about job matches and therefore increase the optimal expected duration of the job shopping period, which is marked by high rates of turnover and unemployment. One interesting difference between the job and person-specific components is that the person-specific factor can be learned through job shopping; thus the greater the share of total uncertainty due to the worker-specific factor, the lower the optimal duration of job shopping.

The implications of this analysis are several. First, some job turnover and the accompanying unemployment is an optimal strategy to acquire information for young workers. Policy interest focuses on those groups who appear to spend

excessive amounts of time in the job shopping period. The analysis suggests that these groups face greater uncertainties about job matches than do other groups; one reason for this might be the effect of formal education in defining more precisely a person's tastes and abilities. The policy implications of this segment of the analysis are not entirely clear since person-specific information will not have the public goods aspects (as does job-specific information) usually required for market failure. Government intervention must, therefore, rest on some other grounds.

B. Ignorance about the Distribution of Job Matches

The other type of imperfect information which may generate job shopping activity is uncertainty about the form of the distribution itself. There are really two forms this imperfection can take: one is where the worker does not know the true distribution and <u>knows</u> that he does not know. The

other case is where the worker has a mistaken idea of the distribution he faces; in other words he does not know that he does not know.

In the first instance, job shopping is motivated by an additional goal — to learn about the distribution of job matches as well as the quality of job matches available at various particular jobs. Through a Bayesian process, each observed job match will alter the prior probabilities that he held concerning the true distribution of job matches. For example, the worker may initially think it equally likely that one of two distributions describe the labor market. Each additional observation of an actual job match will change these prior probabilities. A more certain knowledge of the distribution of offers pays off to the worker as he can make better decisions about accepting jobs.

From the above informal discussion, it is clear that workers with less precise conceptions of the distribution of offers available to them will rationally engage in a longer

period of job shopping. They will then, on average, take a longer time in settling down to a lifetime career. It has been suggested that information about the labor market is primarily transmitted informally by friends and relatives who are acquainted with various jobs. Especially for blue-collar work, these informal information networks are important. Thus, workers who are isolated from informal sources of information about the labor market will experience more job mobility and unemployment. For example, young black men who have been raised in families and neighborhoods where few men work on a regular basis will not acquire the information about the labor market that young white men acquire. They may then experience a more difficult and prolonged transition to a lifetime working career.

The other type of error about the distribution of job matches occurs when workers have a mistaken idea of the true distribution. In other words, they act as though another

distribution were the true one. This will lead to either overly prolonged or unduly short periods of job shopping depending on whether the worker's mistake is in the optimistic or pessimistic direction. If pessimistic, he is tricked into accepting a job before he should while if optimistic, he will be rejecting job matches he should accept. Hence, unwarranted optimism will cause pathologically long periods of job shopping. Groups of workers who hold overly optimistic views of the labor market will therefore move between jobs more than efficiency demands. It has been suggested that the difficulties young black men face in finding lifetime careers may be in part attributable to this excessive optimism. If young, relatively unskilled blacks do not accept good-paying blue collar jobs, holding out for higher status professional employment (or high-paying entertainment or athletic jobs), they may never attach themselves to stable decent-paying jobs. Because of their

excessive optimism (or alternatively preferences for risk-taking), they may reject attainable good jobs for unattainable better jobs.

What can the government do if excessive job shopping is caused by ignorance of the job market distribution itself? The simplest response is to provide this information directly to workers, although it is hard to conceive how this would be done. Perhaps vocational counseling would include this information. Another possibility is that "excessive optimism" stems from certain government policies which allot a small number of "very good" jobs to underqualified blacks (under the guise of affirmative action, etc.). Then the labor market becomes a lottery in which only a few black workers win the biggest prizes; the hope of winning, however, keeps other black workers from accepting good jobs. In other words, they hold out for better jobs which they have a small chance of getting. Before concluding hastily that economic theory necessarily argues against affirmative action programs, the

reader is advised to read the next section of the paper.

C. A Feedback Model

The first two sections of this paper have argued that while a certain amount of job mobility and unemployment among young workers is a natural and efficient mechanism to allocate human resources in the face of imperfect information, "excessive" job mobility among certain groups in the work force may arise if these groups are exposed differently to information about the labor market. For example, workers exposed to a culture (friends and relatives) in which males have not held stable blue-collar jobs will not have the same level of information about the labor market that white workers who are exposed to such a culture do. One could express this idea very simply as the level of information, I, of the young generation of workers being an increasing function of the job attainment, A, of their elders. Letting subscripts denote generations of workers, we have:

$$I_t = f(A_{t-1}),$$

where f is some arbitrary increasing function.

Furthermore, previous argument has indicated that the duration of the job shopping period will be a function of the level of information workers have about the labor market. If the job shopping period is overly prolonged, the ultimate job attained may suffer because workers are discouraged and turn to non-market or extra-legal activity. Or, if the excessive optimism model holds, workers will not stay at decent jobs which they would stay at if they knew the true distribution in the labor market. In both cases, the information imperfection inhibits not only the speed with which ultimate careers are attained, but also the ultimate level of attainment. We can express this relationship as:

$$A_t = g(I_t),$$

where g is some increasing function.

Now we can consider the development of an equilibrium level of job attainment over time. Figure 1 depicts hypothetical f and g functions, with A on the horizontal axis and

I on the vertical. Suppose a demographic group starts with the value of A at point D; this generates information for the next generation equal to the vertical intercept of D. This information then produces an attainment level given at point E by the g function. This lower attainment then spawns less information in the younger generation. The system comes to rest at point C. Similar analysis shows that a group that begins at points like F will be in equilibrium at G. In this way, historical differences in the attainment of the two groups can lead to widely divergent stable equilibria even though the behavioral functions, f and g, are identical for the two groups.[3]

One might think of this model as a "vicious cycle" model in which the original disadvantage of one group spawns, through information transfer, further disadvantage of younger generations. The policy implication of this model is opposite to that of the model discussed above.

Here it could be argued that a government policy which forced blacks into higher ranking jobs would then have a salutary long-run effect on information held by young blacks about the labor market. Eventually, job shopping behavior will change so that the government policy would be no longer needed to support the high attainment equilibrium.

D. Empirical Tests

So far we have presented some alternative models of excessive youth unemployment caused by informational problems in the job shopping period and some policy responses to these problems. In this section, two possible empirical tests of these hypotheses are advanced.

1. A test of the effect of family and social background on job shopping behavior. One would use cross-section data on young workers to see if, accounting for the current characteristics of the worker (schooling, etc,), his early career job mobility pattern is affected by the labor market status of his parents and neighbors. The difficult part of

this test would be to isolate the effect of the worker's background, which influence his labor market information, and his current characteristics, such as race or schooling level. In the sample, these will all be highly correlated.

2. A test of the effect of formal schooling on the efficiency of job shopping. Again using longitudinal data on individual workers to examine job mobility and career attainment patterns during the job shopping period, one could test the effect of formal schooling on these patterns. The theory predicts that workers with less schooling will move more between jobs in an attempt to learn more about their own tastes and abilities.

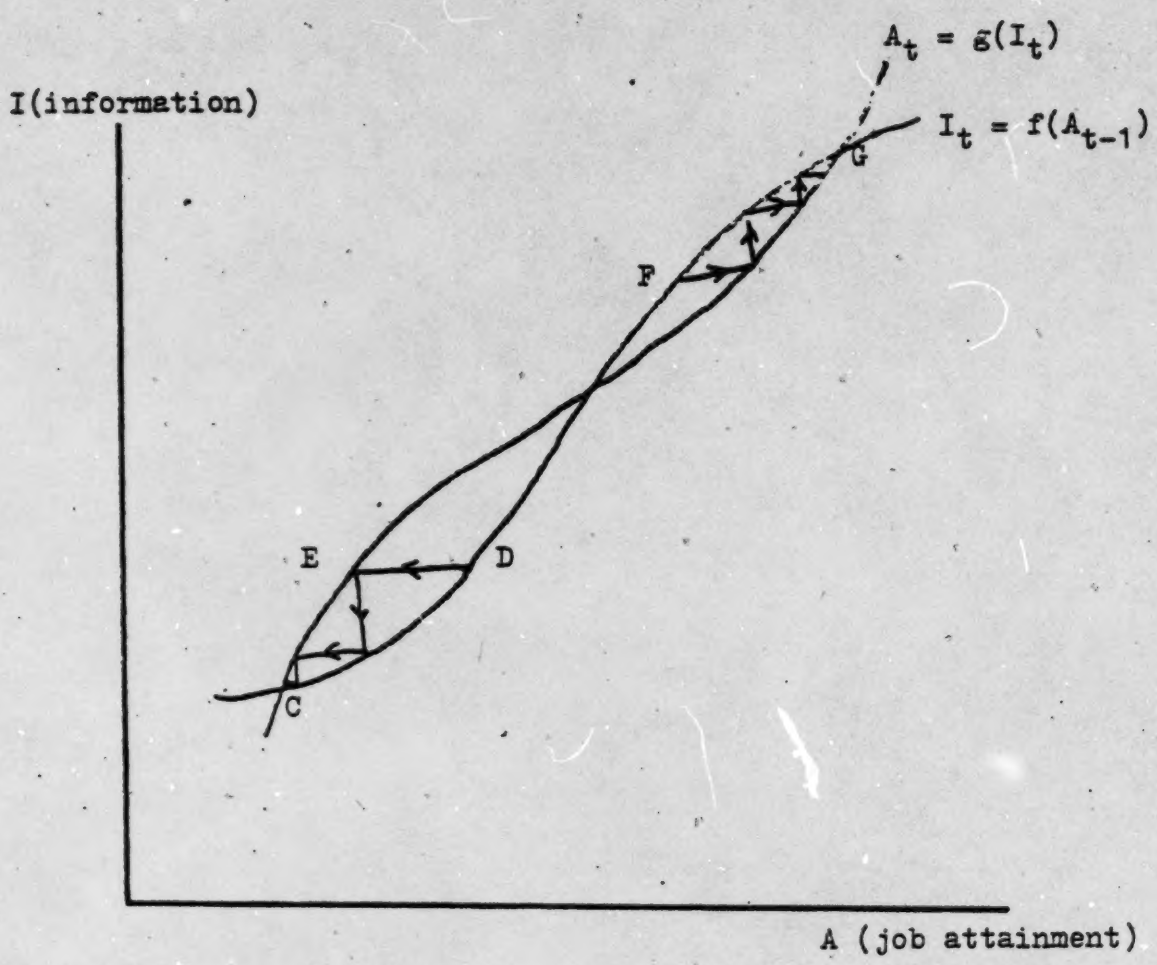

Figure 1

Footnotes

1. Hall (1972) ascribes much of the difference between black and white unemployment rates to greater turnover by blacks.

2. See Lippman and McCall (1976) for a survey of the search literature.

3. This model is reminiscent of models by Arrow(1973) and Starrett(1976).

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